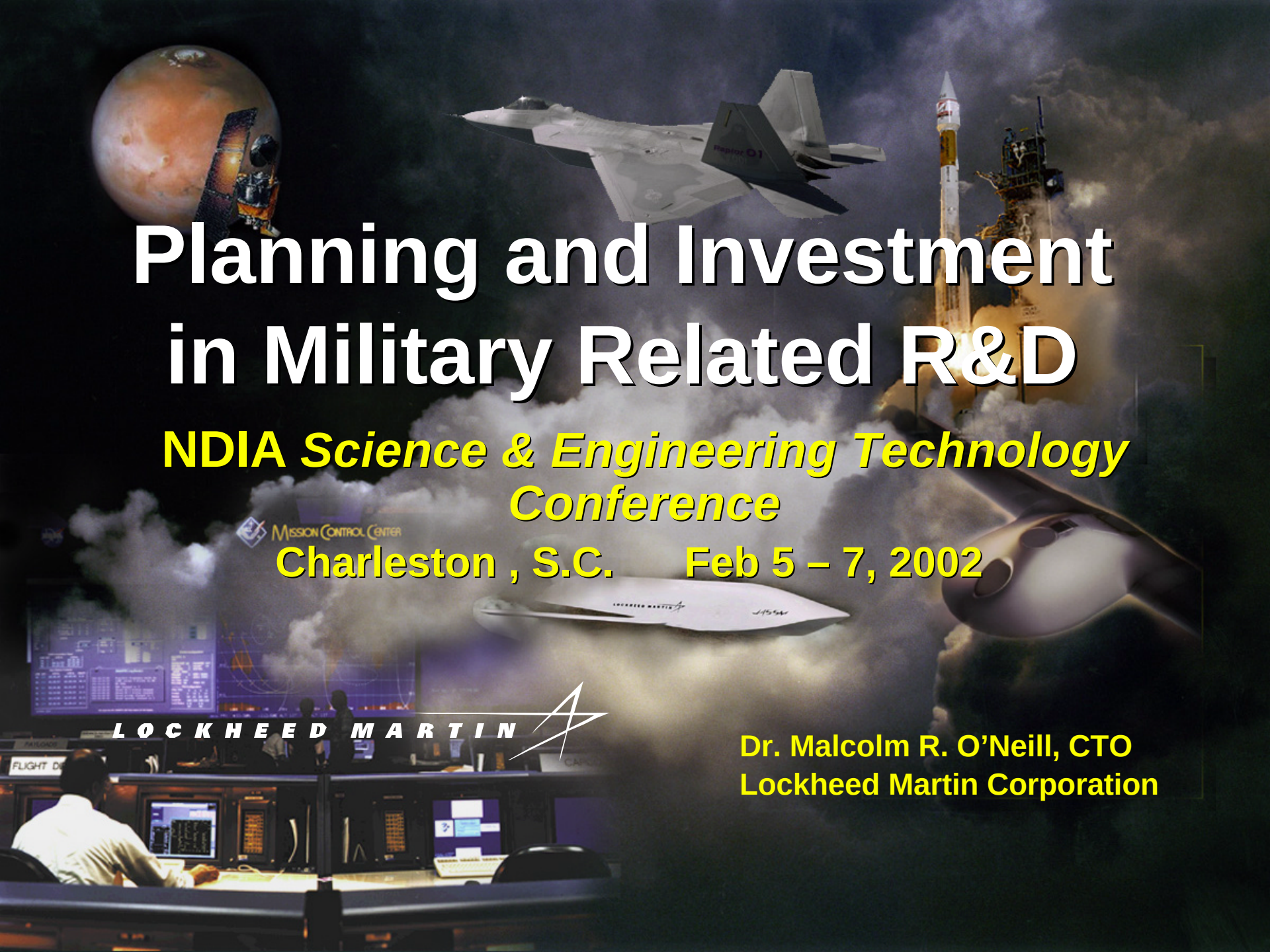


Planning and Investment in Military Related R&D

NDIA *Science & Engineering Technology Conference*

Charleston , S.C. Feb 5 – 7, 2002

Dr. Malcolm R. O'Neill, CTO
Lockheed Martin Corporation

Topics

R&D Investment for Military Systems

- Working with the Customer on Technology Transformation
- Industry Best Practices
- Lessons Learned

War Fighting in the 21st Century

Future Warfighting Blueprint Based on an Architectural Perspective … Operational … Systems … Technical

- **Dominant Maneuver**
- **Full-Dimensional Protection**
- **Precision Engagement**
- **Focused Logistics**

… Joint Vision 2020

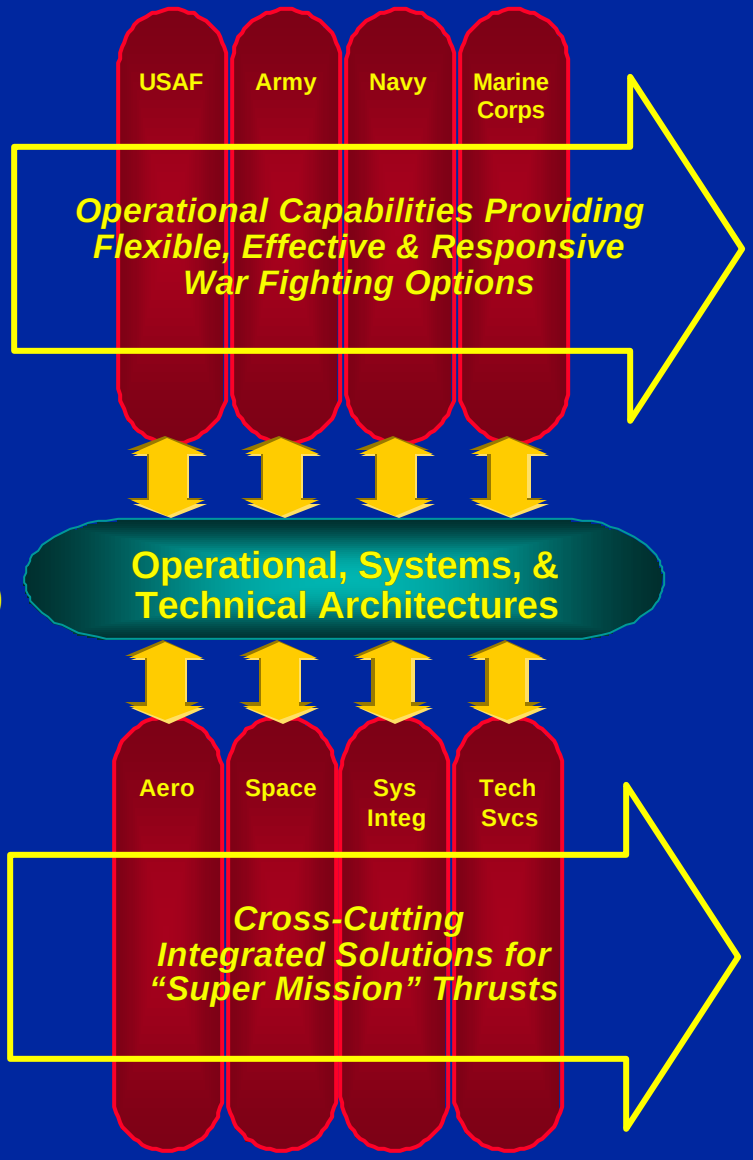
… Inside the Adversary's Decision Loop

A New Level of Integration

Government - DoD

- Goldwater Nichols Act
- Coalition Operations
  (Desert Storm, Bosnia,…)
- Defense Strategy (JV2020)
- Joint Forces Command
- *September 11th* Response

Industry

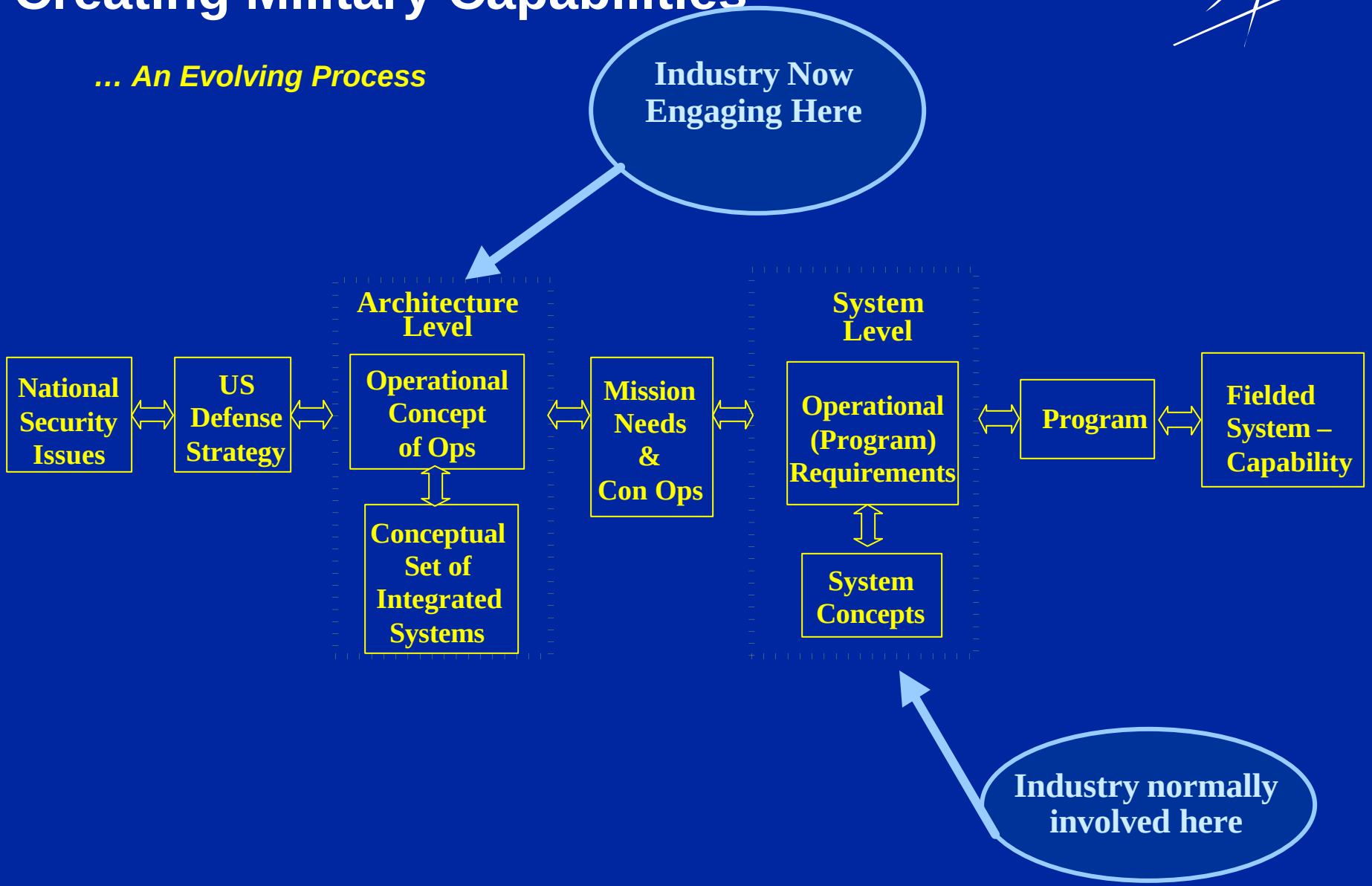


Joint CONOPS
Synchronized Execution
Flexible Combat Solutions
Coalition Force Integration

Interoperable Systems
Increased Use of Automation
Network Centric Solutions

Creating Military Capabilities

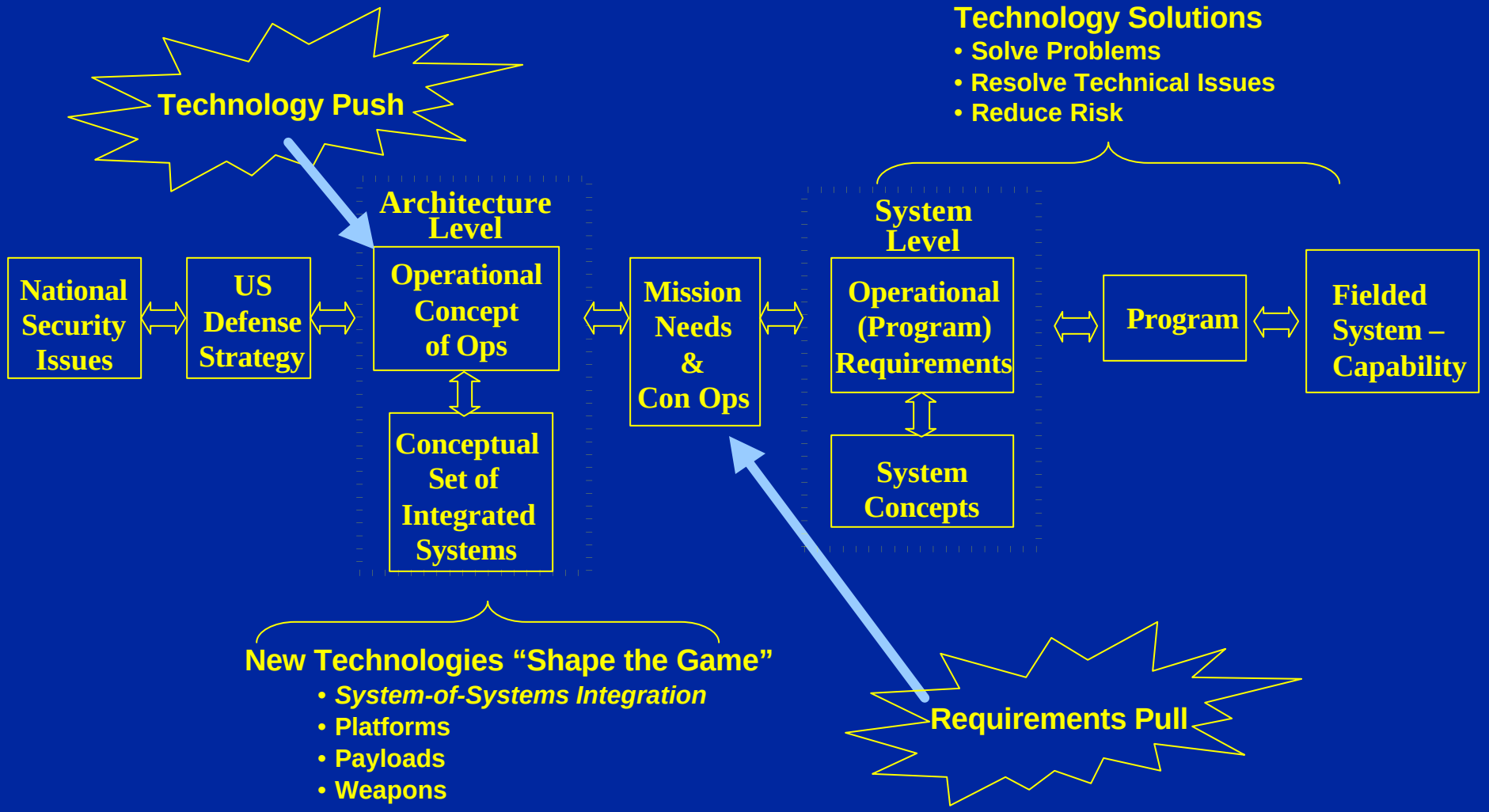
… An Evolving Process



5

Creating Military Capabilities

… An Evolving Process



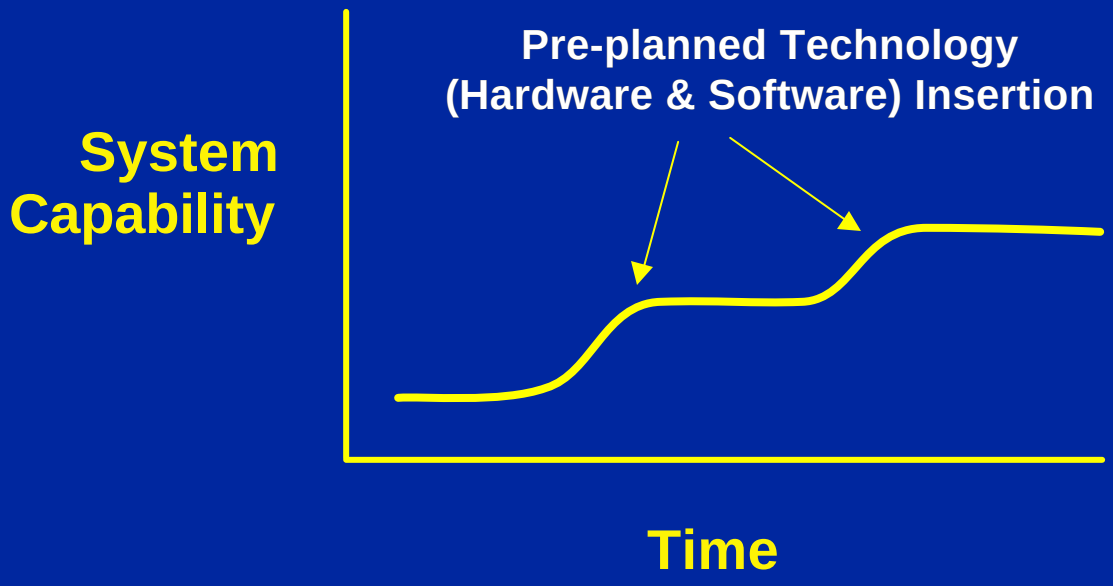
Industry Best Practices

- **Technology Readiness Level Assignment, Tracking and Planning**
- **Spiral Development and Planned System Improvements**
- **Rapid Prototyping, and Residual Operational Capability**
- **Make/Buy and Partnering**
- **Portfolio Balancing**
  - **Evolutionary/Revolutionary**
  - **IRAD/CRAD**
  - **Manufacturing Technology**

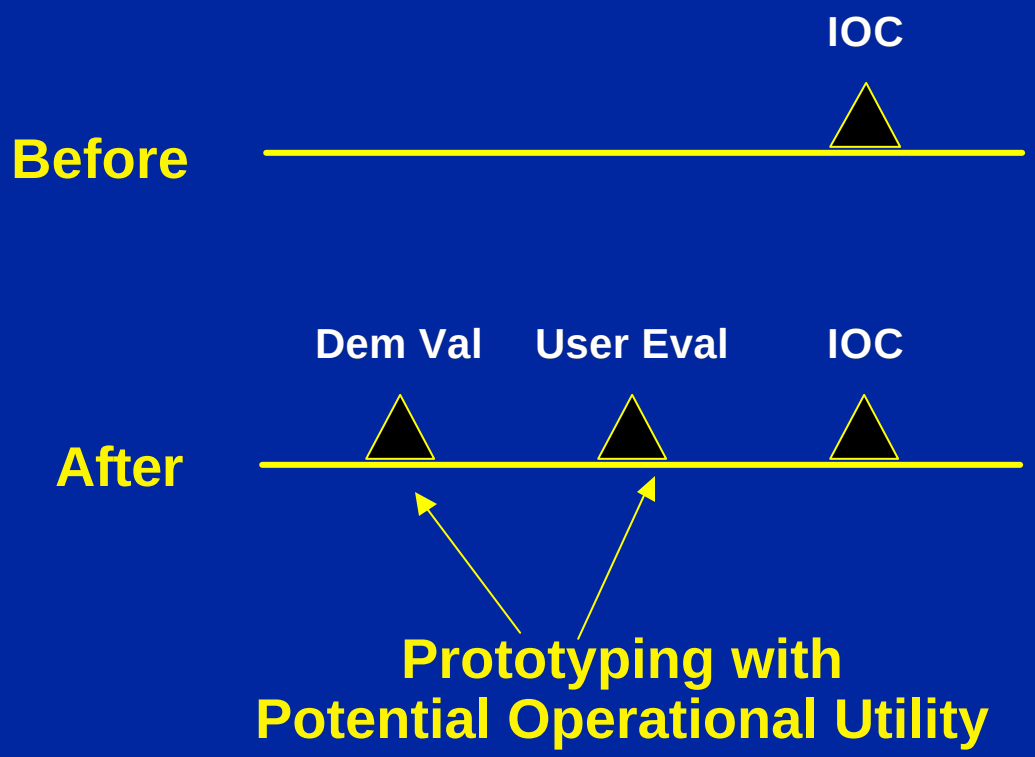
Technology Readiness Level Assignment, Tracking & Planning

- ***Basic Technology Research:***
  - **Level 1: Basic principles observed and reported**
- ***Research to Prove Feasibility:***
  - **Level 2: Technology concept and/or application formulated**
  - **Level 3: Analytical and experimental critical function and/or characteristic proof of concept**
- ***Technology Development:***
  - **Level 4: Component and/or breadboard validation in laboratory environment**
- ***Technology Demonstration:***
  - **Level 5: Component and/or breadboard validation in relevant environment**
  - **Level 6: System/subsystem model or prototype demonstration in a relevant environment (ground or space)**
- ***System/Subsystem Development:***
  - **Level 7: System prototype demonstration in a space environment**
- ***System/Test Launch & Operations:***
  - **Level 8: Actual system completed and "fight qualified" through test and demonstration (ground or space)**
  - **Level 9: Actual system "flight proven" through successful mission operations**

Spiral Development and Planned System Improvements



Rapid Prototyping and Residual Operational Capability



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Industry Lessons Learned

- **Return On-Investment Metrics**
- **COTS Technology**
- **Commercialization/Technology Mining**
- **Corporate R&D Labs/Centers**
- **IRAD Mortgaging**

Conclusion

- **Customer must be included early-on**
- **Observing best practices and lessons learned will lead to mission success**